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Appl. No.: 10/631,907  
Amdt. dated 12/19/2005  
Reply to Office action of 10/18/2005

### REMARKS/ARGUMENTS

In the Office Action dated October 18, 2005, Claims 19, 21, 30, 31, and 33-46 are pending. Claims 19, 30, 31, and 33-46 are rejected under 35 U.S.C. § 112, first paragraph. Claims 19, 30, 31, 38, 39, 41, and 42 are rejected under 35 U.S.C. § 102(b) as being anticipated by JP 10195567A ("JP '567"). Claims 21, 33-37, 40, and 43-46 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '567 in view of U.S. Patent No. 4,159,666 to Briles.

Applicant respectfully traverses the rejections for the following reasons.

#### I. Rejection under § 112, first paragraph

Regarding the rejection of Claims 19, 30, 31, and 33-46 under 35 U.S.C. § 112, first paragraph, the Office Action states that the claims as last amended include new matter. In the Amendment filed August 3, 2005, independent Claim 19 was amended and Claims 35-46 were added, including independent Claim 38. Claim 19, which is directed to a rivet with a shank and head that substantially comprise a particular grain structure, was amended to further recite that "said shank and said head consist essentially of one of the group consisting of aluminum, an aluminum alloy, titanium, and a titanium alloy." Regarding this amendment, the Office Action states:

The disclosure consistently used "comprising" when discussing the materials thus not limiting the material to the specific group. The amendment [to] the claims adding "consist essentially of" is new matter.

Office Action at page 2.

Applicant respectfully disagrees with this characterization of the application. The application does disclose embodiments in which the shank and head "comprise" aluminum, an aluminum alloy, titanium, or a titanium alloy. *See, e.g.*, page 3, lines 18-19 ("In one embodiment, the shank and head comprise aluminum, an aluminum alloy, titanium, or a titanium alloy.") However, the application also discloses that the shank and head can be solely of one of the recited materials, *e.g.*, an aluminum alloy. In particular, the application clearly describes one embodiment in which the rivet 4 is formed from a particular aluminum alloy, namely AA 2195-T6. *See* page 9, lines 9-24. This embodiment is also illustrated in Figures 11 and 12 at

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magnification that is sufficient for illustrating the structure of the material. Applicant respectfully submits that a rivet that is formed of AA 2195-T6 "consists essentially of" an aluminum alloy as claimed.

The Office Action also asserts that the "consist essentially of" language in independent Claim 38 constitutes new matter. Claim 38 is directed to a rivet having a shank with a head and recites that "said shank and said head consist essentially of a grain structure having a grain size between about 3 microns and 5 microns." Although the patent application describes embodiments in which the shank and head "comprise" a refined grain structure, the application also discloses that the shank and head can consist essentially of a grain structure having the recited grain size. For example, regarding one embodiment of the present invention, the application states:

The rivets 4 are formed of a metal or metal alloy such that the rivets have a refined grain structure, and preferably a refined grain structure with a grain size of less than about .0002 inches (approximately 5 microns). More preferably, the rivets 4 are formed of a metal or metal alloy such that the rivets consist essentially of, according to one embodiment, or substantially comprise according to another embodiment, a refined grain structure with a grain size ranging in order of magnitude from approximately .0001 to approximately .0002 inches (approximately 3 to 5 microns) and having equiaxed shape.

Present application at page 7, lines 17-24. Thus, the specification of the application clearly does describe the invention as claimed.

Accordingly, Applicant respectfully submits that the claims as presently pending do not include new matter and therefore requests withdrawal of the rejection under § 112.

## **II. Rejections under § 102 and § 103**

Applicant now addresses the rejection of Claims 19, 30, 31, 38, 39, 41, and 42 under § 102(b) as being anticipated by JP '567.

### **(a) Independent Claim 19**

In this regard, the Office Action states:

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In the translated abstract and use of the Japan '567 reference is disclosed . . . a rivet manufactured to include a matrix having a grain size of 5 micrometers or less which is within the claimed range. Japan further discloses the material to include aluminum and its combination with other materials would make an aluminum alloy.

Office Action at page 3 (emphasis added).

Applicant respectfully disagrees. As noted in the previous amendment, the term "alloy" does not refer to a mere "combination of materials." See Amendment filed August 3, 2005 at page 5 (citing The American Heritage® Dictionary of the English Language, Fourth Edition). Rather, an alloy is a "homogeneous mixture or solid solution, usu. of two or more metals, the atoms of one taking the place of or occupying interstitial positions between the atoms of the other." Webster's II New College Dictionary, Houghton Mifflin Company, 1999.

JP '567, on the other hand, is specifically directed to a non-homogeneous "aluminum composite material wherein aluminum oxide particles, aluminum carbide particles and boride particles are dispersed in an aluminum or aluminum alloy matrix." Translation of JP '567 at paragraph 5 ("Means of Solving the Problem"). In fact, as noted in the previous amendment, JP '567 is specifically directed to an aluminum matrix composite material that includes dispersed particles of aluminum and boride, not an alloy, i.e., a homogenous. To the contrary, JP '567 addresses the difficulties in providing "a uniform dispersion of reinforcing particles in matrix [which] is important for enhancing the characteristics of particle-dispersed type composite material," including "the difficulty of uniformly dispersing the particles because the specific gravity of boride particles differs greatly from that of molten aluminum." Paragraph 2 (emphasis added). "The purpose" of JP '567 "is to provide self-lubricating aluminum composite material in which the coefficient of friction is decreased and weight loss of the material itself due to wear is reduced, and that also has outstanding characteristics of high strength, wear resistance, and self-lubricating properties while wear of partner material, which lacks wear resistance, is inhibited through the effects of self-lubricating dispersed particles, as well as its production." Paragraph 4. Accordingly, JP '567 states that "[a]luminum oxide particles, aluminum carbide particles and boride particles having aforementioned mean grain size are uniformly dispersed at aforementioned volumetric fractions in aluminum or aluminum alloy matrix particles in the

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aluminum composite material pursuant to the present invention.” Paragraph 12. Such a composite material having particles dispersed throughout a matrix as disclosed by JP '567 is not an alloy. Thus, JP '567 does not teach or suggest any rivet that is formed of a material consisting essentially of aluminum, an aluminum alloy, titanium, or a titanium alloy as claimed.

Accordingly, Applicant submits that Claim 19 is allowable over JP '567.

**(b) Independent Claim 38**

Regarding the rejection of Claim 38, the Office Action states:

In regards to claim 38, the material not having the grain size of 5 micrometers or less is such a small percentage of the overall volume (less than 8%) the structure would continue to “consist *essentially* of” the grain size of 5 micrometers also, the small amount of material which does not fall within the claimed range is “about” within the range.

Office Action age page 3 (emphasis in original).

First, Applicant disagrees with the above characterization of the material disclosed by JP '567 in relation to the claimed invention. Claim 38 recites that the shank and head of the rivet “consist essentially of a grain structure having a grain size between about 3 microns and 5 microns.” JP '567, on the other hand, discloses:

a self-lubricating aluminum composite material wherein aluminum oxide particles, aluminum carbide particles and boride particles are dispersed in an aluminum or aluminum alloy matrix, the mean grain size of the matrix being not more than 5  $\mu\text{m}$ , the mean grain sizes of the dispersed aluminum oxide particles and aluminum carbide particles together being not more than 100 nm, and the mean grain size of the boride particles being not more than 1  $\mu\text{m}$ . In an ideal mode, the volumetric fractions of dispersed aluminum oxide particles and aluminum carbide particles would be under 5% each. Furthermore, the volumetric fraction of boride particles should be under 30% and the total volumetric fraction for both dispersed aluminum oxide particles and aluminum carbide particles should be greater than 0.5% and less than 8%.

Translation of JP '567 at paragraph 5 (“Means of Solving the Problem”). Thus, the composite material disclosed by JP '567 includes three components with grain structures outside the recited

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range: aluminum oxide particles, aluminum carbide particles, and boride particles. The total volumetric fraction of these three materials in the "ideal mode" is not more than 38%. That is, the volumetric fraction of boride particles should be under 30%, and the total volumetric fraction for both dispersed aluminum oxide particles and aluminum carbide particles should be greater than 0.5% and less than 8%. JP '567 does not disclose a material in which "less than 8%" of the overall volume has a non-conforming granular structure as asserted in the Office Action. Moreover, a composite that includes materials outside the claimed range in a volumetric fraction of not more than 38% does not "consist essentially of" the claimed granular structure. Indeed, given the significance of the grain size to the formability of the rivets of the present invention, a composite material that has a volume of as much as 38% of material outside the claimed range cannot be considered to "consist essentially of" the claimed material.

In addition, Applicant disagrees with the statement that "the small amount of material which does not fall within the claimed range is 'about' within the range." Office Action at page 3. JP '567 discloses materials that are significantly outside the claimed range. In particular, the mean grain size of the aluminum oxide and aluminum carbide particles together is not more than 100 nm and the mean grain size of the boride particles is not more than 1  $\mu$ m. Thus, even at the largest values disclosed by JP '567, the mean grain size of the boride particles is no more than 1/3 of the size of the smallest value in the claimed range, and the mean grain size of the aluminum oxide and aluminum carbide particles is no more than 1/30 of the size of the smallest value in the claimed range.

For each of these reasons, Applicant respectfully submits that independent Claim 38 is allowable over JP '567.

***(c) Dependent claims***

Each of the pending dependent claims is allowable over the cited references for at least the reasons set forth above. In addition, Applicant submits that the dependent claims provide additional bases of distinction over JP '567, even in combination with Briles.

In particular, Claim 31 depends from Claim 19 and further recites that "said shank and said head comprise a refined grain structure formed by stirring with a friction stir welding

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probe." Similarly, Claim 41 depends from Claim 38 and further recites that "said shank and said head comprise a refined grain structure formed by stirring with a friction stir welding probe." In this regard, the Office Action states that "[t]he stir welding is a product-by-process limitation wherein it is only the final product considered for patentability." Office Action at page 3. Applicant respectfully submits that the feature of Claims 19 and 38, i.e., a refined grain structure achieved by friction stir welding, results in a feature of the product itself. Further, the refined granular structure that results from friction stir welding provides an additional basis of distinction over the cited references.

\* \* \* \*

### CONCLUSIONS

In view of the remarks presented above, Applicant submits that Claims 19, 21, 30, 31, and 33-46 are allowable and the present application is in condition for allowance. As such, the issuance of a Notice of Allowance is therefore respectfully requested. In order to expedite the examination of the present application, the Examiner is encouraged to contact Applicant's undersigned attorney in order to resolve any remaining issues.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



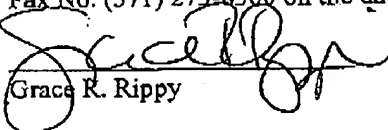
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